THE

Chick Book

It Takes FOUR KEYS to Unlock this Door

THE doorway to Maximum Poultry Profits cannot be unlocked with one key alone—or two—or three. It takes all four keys: 1. Good Breeding. 2. Good Feeding. 3. Good Care and Management and 4. Good Marketing. If any are missing the results **and your profits** will be affected.

All statements made in this booklet regarding the results to be expected from the use of Larro Poultry Feeds are based upon this fundamental truth. Good feed is essential if you are to make the most of the profit possibilities of your flock—and the better the breeding, care, management and marketing that go with this good feed—the better your profits will be.

Remember that feed does only the **feeding** job and it is very important that this job be done right. It is the business of Larro Research Farm, first and foremost, to develop the rations which will help do that job best for your flock—and, secondly, to provide you with as much information as it can about the other three keys to maximum poultry profits. Our experience is always at your disposal. If you have any questions which you do not find answered on the following pages, you are welcome to write us at any time. We will always help you to the best of our ability.

LARROWE MILLING COMPANY
Dept. C. Detroit, Michigan

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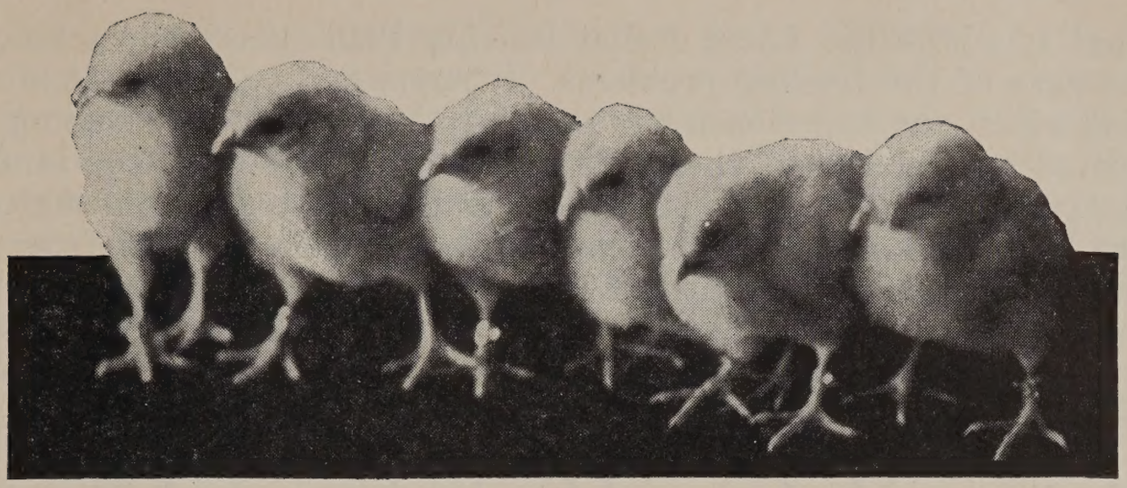


The Larro Pullet Raising Plan

Each year the poultryman who produces market eggs is faced with the job of raising pullets which he can add to his laying flock—and a mighty important job this is. Much of his success depends upon how well this annual task is performed, because a flock of layers—however small or large—is just a group of feathered machines that make eggs out of feed, grit, shell and water. It is obvious that if these machines are well built, first of all, and then efficiently operated, the results will be more satisfactory than they will if the machines are poorly built and badly run. The birds will live longer, produce more eggs and make more money for their owner.

Note that we say they must, first of all, be well built. Much of this "building" is done long before the poultryman ever sees the baby chicks themselves. Take the pullets you will house next fall, for example. As you read this they may be partly-formed eggs in the bodies of the breeding hens. But your chicks are being built, just the same, and the work has been going on a long time. For the chick building job begins way back with the stock from which they are to come.

That's why we say that good parent stock is very important. Take no unnecessary chances with this factor when you buy your chicks. Do all you can to be **sure** you get well-hatched chicks, that are strong, healthy and have a background of good egg production and constitutional vigor. These characteristics cannot be **fed** into the chicks. They can only be **bred** into them. Feeding and care only help to bring about the development of the inherent possibilities which the ancestors of your chicks hand down to them. Be as sure as you can that **your** chicks are well supplied with these precious gifts.

From Chicks to Layers—A Complete Plan

Once you have obtained your chicks and assured yourself that they are good ones—then comes the job of raising them. They should be so fed and managed that the pullets develop into profitable layers. Their ancestors laid the foundation of their health and all-round ability. It is up to you to complete the structure by good care and a proved feeding program.

That is where the Larro Pullet Raising Plan enters the scene. It takes care of the feeding problems. It supplies two mashes and two grains which our experience has shown to be right for developing the inherited possibilities of the birds and helping you build the kind of flock you desire. Give this plan a clear track. Go **straight through** the Larro Way. Let Larro do a complete feeding job for you from the time the baby chicks are hatched until the finished pullets are turning out eggs for you. We believe you will be so pleased with the results that you will be eager to continue to feed your pullets the Larro Way all the rest of their lives.

Just Two Mashes and Grains Instead of Three

First among many features of the Larro Pullet Raising Plan is its simplicity:

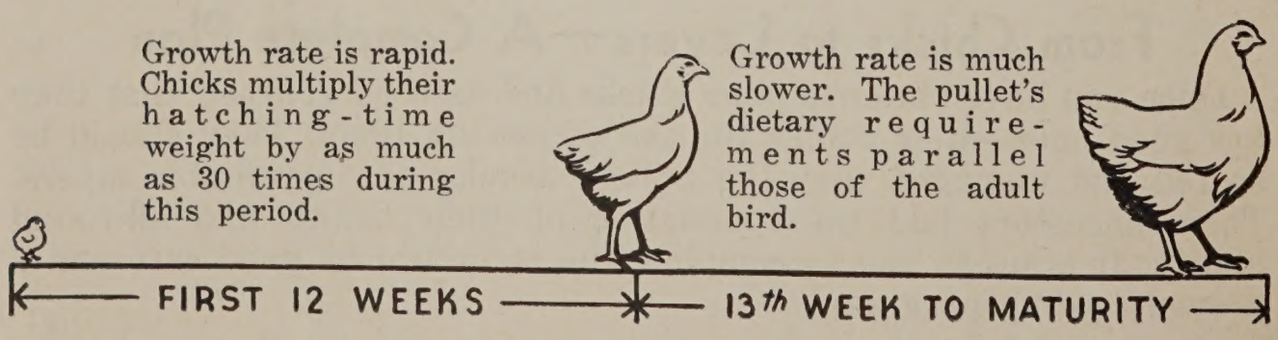
LARRO CHICK BUILDER with controlled grains feeding the first 12 weeks.

Then LARRO EGG MASH and Scratch Grains—both hopper fed to maturity.

Just two mashes and two grains to buy, store and handle—instead of three. Just one change of mash and one of grains instead of two of each as formerly. And no tapering off from one mash to the other. The two feeds—Larro Chick Builder and Larro Egg Mash—are so closely related, so well "geared" one to the other, that when you change, at 12 weeks, you simply stop feeding one and begin feeding the other—and it's the same with the grains. There is no "shock" to the birds' systems due to nutritional changes as there may be when you change to an entirely different ration. The result is that your chicks go **straight through** from chickhood to laying age on two carefully fitted mashes which, when fed as directed with Grains, provide the proper known nutrients at the right time.

Why is Larro Chick Builder Fed For 12 Weeks?

Look at the accompanying illlustration and you will see that baby chicks multiply their weight as much as 30 times during the first 12 weeks of life. Then note what happens to the growth rate between the 12th week and maturity. The pullets hardly double their 12-weeks weight—a much lower rate of growth.



After many years of careful testing at Larro Research Farm, our results (now further confirmed by three years of use by thousands of poultrymen) show that Larro Chick Builder is extremely well adapted to this early period of rapid growth rate. Hundreds of other chick ration formulas were tested in competition with Chick Builder, but none did quite so well in the light of all-round results in livability, health, growth, feathering, bone and body development—and the egg production of the birds after maturity.

Eggs Tell the Real Story of Chick Ration Quality

Many poultrymen judge the value of a chick ration by what they can **see** during the early stages of growth. If after several weeks there are very few losses, the chicks appear healthy, are well feathered and general growth seems satisfactory, they decide that the ration is good. Actually, these early indications tell only part of the story. The real answer doesn't come until the birds are **in the nests** and "saying it with eggs."

That is why Larro offers you—not a "chick raising plan"—but a "pullet raising plan" that takes the flock "straight through" to maturity. However robust and well developed they may be, chicks at six to twelve weeks are still "unfinished." They have a lot of growing and developing to do. Improper feeding during this tremendously important in-between period can spoil weeks of previous work, no matter how well bred the birds are, or how well cared for otherwise. Half-grown pullets are still not egg producers. The job of **developing** their inherited ability to make money for you is not complete until they have become **layers.** Therefore the right plan, we believe, is one that recognizes this and goes **straight through** to the **right** finish.

Fifteen Years of Testing Produced this Simple Plan

The Larro Pullet Raising Plan—like most good things—grew slowly. It developed out of 12 years of work at Larro Research Farm. Thousands of birds of many different breeds were used. Hundreds of different formulas and feed ingredients were carefully tested and the results recorded in detail. Volumes of project reports in the library of the Larro Research Department bear witness to the wide field of nutritional research covered during these years and the painstaking care with which the tests were carried on and recorded.

All because the men responsible for developing Larro Feeds insist upon thoroughness and accuracy. Guesswork is strictly forbidden at Larro Research Farm. Not a word was published about this plan until these specialists were convinced that the plan was right and would perform as well on the nation's poultry farms as it had performed for them.

Their confidence proved to be well founded. The Larro Pullet Raising Plan was first announced in December, 1935. Since then it has built a splendid reputation and made thousands of loyal friends from

Maine to Florida. Thousands of tons of Larro Chick Builder and Larro Egg Mash have been fed to chicks and pullets in three full seasons since that first announcement. The Larro Pullet Raising Plan is now entering its fourth season, as this is written, with every sign pointing to steadily increasing popularity.

What are the Advantages to the Poultryman?

On a previous page we referred to the convenience and the economy in money and labor of the Larro Plan—which requires only two mashes and two grains instead of three of each. There are other and even more important advantages, we believe. For what the poultryman wants is a plan that will produce good layers for replacement—birds that will fill the gaps in his flock next fall and keep the eggs rolling in.

Here are some of the factors considered in measuring the value of the Larro Pullet Raising Plan:

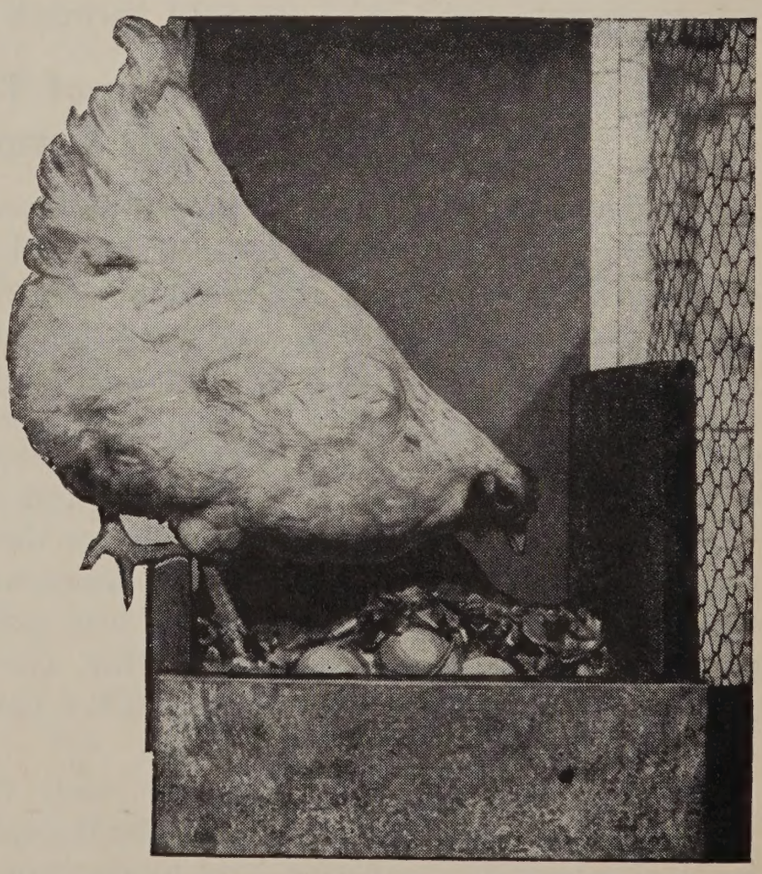
RESULTS TO MATURITY

Livability
Weight Gains
Feathering
Pigmentation
Leg Condition
Bone and Frame Development
Body Capacity
Feed Consumption
Feeding Efficiency
Age at First Egg

RESULTS AFTER MATURITY

Egg Production
Size and Quality of Eggs
Nutritional Health
Molt
Feed Consumption
Feeding Efficiency
Profit over Feed Cost

The formulas of Larro Chick Builder and Larro Egg Mash, and the Larro Pullet Raising Plan were selected because, when all these factors were considered, the results they produced were better than those of any other combination of feeds of which we have knowledge. In the final analysis, there is just one standard of measurement—profit over feed cost. The Larro Plan won for us by that standard because every one of the above factors by which we measured its performance, contributes to profit over feed cost. Give the Larro Pullet Raising Plan a chance to do the same for you.



Feeding Directions For Chicks and Pullets

Chicks may be put into brooders and feeding started as soon as the hatch is completed unless they are in a somewhat weakened condition due to faulty incubation or other causes. In such a case they had best be left in the darkened incubator, or in chick boxes, until 24 hours after the hatch is completed. (But in such case it should be remembered that you do not have the first essential to better pullets: a healthy, well-hatched chick.)

Purchased chicks should be placed in brooders and feeding started as soon as shipment is received, as, in most cases, sufficient time will have elapsed after hatching.

Water

As soon as chicks are put into the brooder, supply drinking water from which the chill has been taken. From this time on the chicks should never be without an ample supply of clean, fresh water.

Water is about the cheapest, and yet one of the most important requirements of the growing chick. Hence we repeat: Chicks should never be without an ample supply of clean, fresh water.

Grit

Supply chick-sized hard grit before the chicks receive their first feed. An average handful will be sufficient for 100 chicks. It may be scattered on top of the litter, or on shallow plates or boards. No more grit will be necessary until the chicks are three weeks old, after which time keep a container of hard grit constantly before them.

Chicks will live and grow into "pretty good" pullets without grit of any kind. However, when grit is supplied the chicks use their feed more efficiently, requiring less feed per pound of growth.

Mash

One hour after giving water and grit, feed Larro Chick Builder—just as it comes from the bag; add nothing to it.

Although excellent results invariably follow the quite common practice of leaving the mash constantly before the chicks right from the start, we have found that in many instances somewhat better results are obtained by feeding the mash four times, at equal intervals, during the first feeding day. Hence we recommend this procedure: Leave the mash before the chicks thirty minutes at each feeding, the last feeding to be about thirty minutes before nightfall.

After the first day, keep Larro Chick Builder constantly before the chicks until they are twelve weeks old.

Beginning with the thirteenth week, change from Larro Chick Builder to Larro Egg Mash. Keep Larro Egg Mash constantly before the birds from this time on.

Grains

Feed no grains until the chicks are ten days old.

From the eleventh day through the sixth week feed Larro Chick Grains twice daily. The grains may be fed in litter, in separate troughs or, preferably, scattered on top of the mash (Larro Chick Builder). Give about one-third of the daily supply in the early morning; two-

thirds in late afternoon. During this period regulate the quantity so that the chicks eat about one pound of grain for each five pounds of Larro Chick Builder consumed.

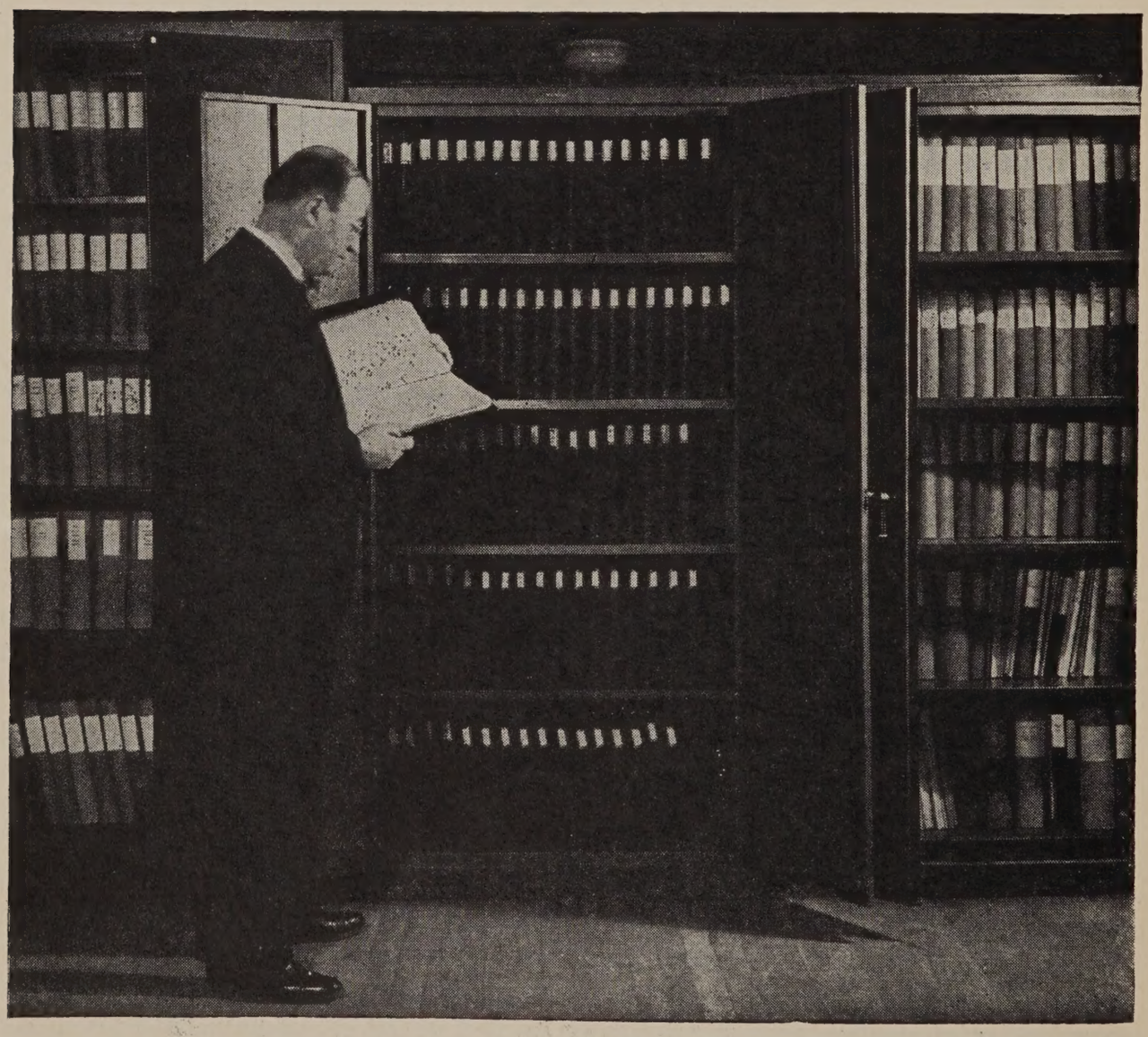
Beginning with the seventh week, or at such time as the chicks can handle the larger-sized particles, change from Larro Chick Grains to Larro Scratch Grains.

From the seventh to twelfth weeks, inclusive, hand-feed the Larro Scratch Grains twice daily, regulating the amount so that the chicks eat about one pound of grain for each three pounds of Larro Chick Builder consumed.

Then, beginning with the thirteenth week, put Larro Scratch Grains before the growing birds in open hoppers. From this time on, until transferred to laying quarters, the birds will have both Larro Egg Mash and Larro Scratch Grains before them at all times in open hoppers.

Supplements

Water—hard grit—oyster shell—Larro Mashes and Grains, as recommended, supply all known nutritive essentials. No other supplements are needed with Larro Feeds.



These volumes contain summarized reports of the results of hundreds of poultry feeding experiments at Larro Research Farm. Many thousands of birds have been used in these tests. The benefit of this work is passed on to you in Larro Poultry Feeds.

Special Feeding Directions for Different Breeds and Strains

Early maturing breeds or strains frequently complete their rapid growth period by the tenth or eleventh week and may be changed from Larro Chick Builder to Larro Egg Mash at that time. Chicks of late maturing strains of larger breeds may require thirteen weeks to complete this period of rapid growth. The appearance of the pullet is the best guide as to the proper time to change to Larro Egg Mash. As long as the pullet has an unfinished, awkward, gawky appearance, use Larro Chick Builder. When they take on the smooth appearance of miniature hens they are ready for Larro Egg Mash. When in doubt, change at the end of the twelfth week.

Feeding the Cockerels

Cockerels and pullets will develop into good breeding stock on the same feeding schedule.

The earliest possible segregation of the sexes is desirable whether the cockerels are to be disposed of on the market as soon as they have reached market size or whether they are intended for breeding stock.

When it is the aim to mature the pullets for layers but to market the surplus cockerels as broilers, the chicks should all be on the Larro Chick Builder program as outlined. As soon as the cockerels can be distinguished, they should be separated and changed to Larro Broiler Feed, following the Larro feeding directions for broilers.

If, for some reason, the surplus market cockerels have been kept on the Chick Builder Program until they have approached market size, they may be kept on this program until marketing time. A somewhat better finish and a profitable weight increase can be obtained on such market birds by feeding them cracked corn soaked in milk during the last ten to fifteen days before marketing. Soak the cracked corn over night in skimmed milk, buttermilk or a solution of 3 lbs. water to 1 lb. of condensed buttermilk. Give the cockerels all they will eat in two feedings; one in the morning and one late in the afternoon. This soaked corn is fed in addition to the regular Larro Mash and Grains.

Abnormal Conditions

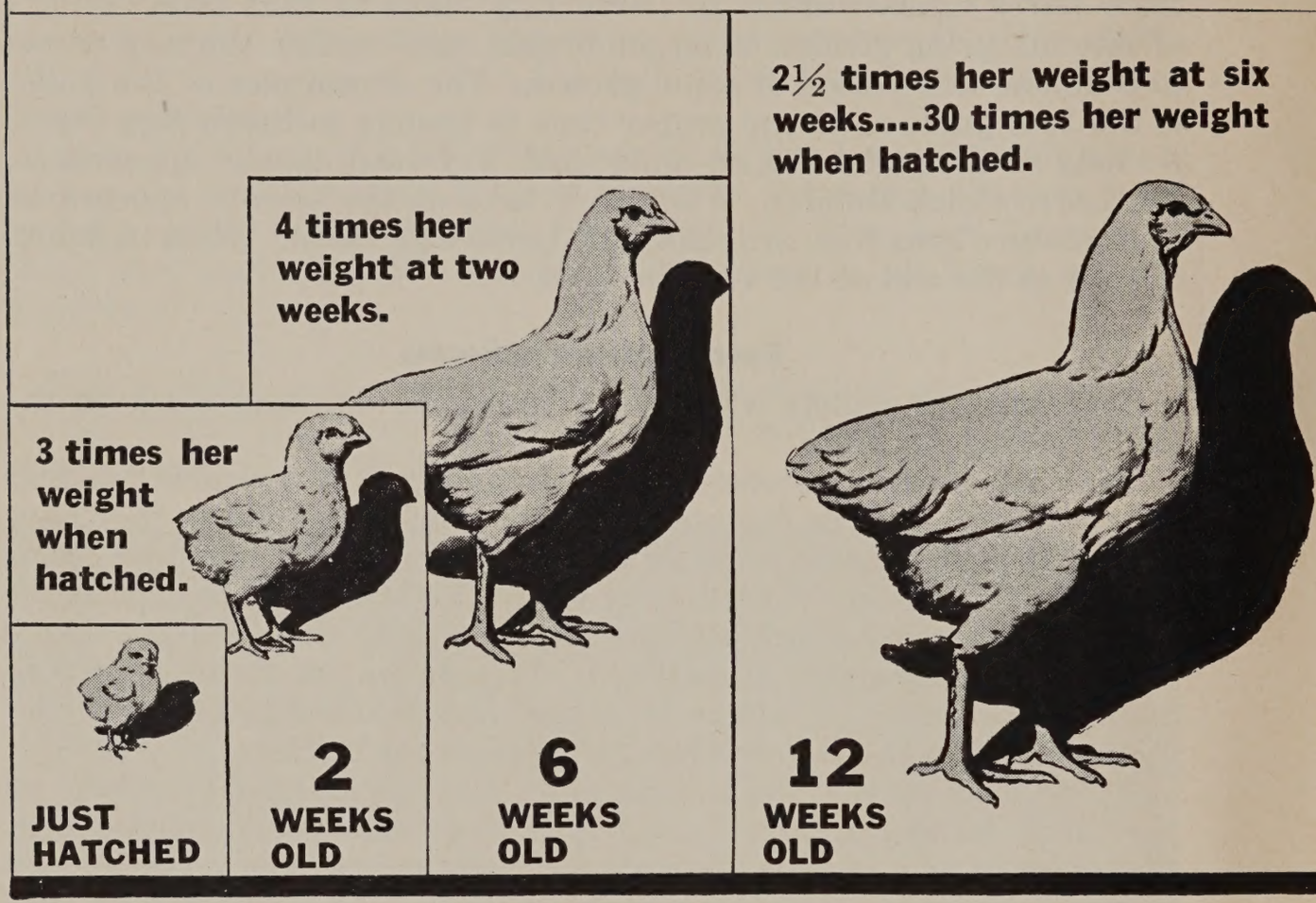
Occasionally, even in the best managed flocks, chicks will suffer a temporary setback due to coccidiosis, bronchitis or other diseases. In such cases continue to feed Larro Chick Builder until the pullets show, by appearance, that they have finished the period of rapid early growth.

Battery or Cage Feeding

Those who desire to grow their pullets in batteries for later transfer to laying cages will find the new, thoroughly tested and simplified Larro feeding method, specially designed for that purpose, productive of best results. Full information about this method may be had by writing to Larrowe Milling Company, Dept. M., Detroit, Michigan.

The Larro Pullet Raising Plan Provides

Typical Average Growth Rate for First 12 Weeks



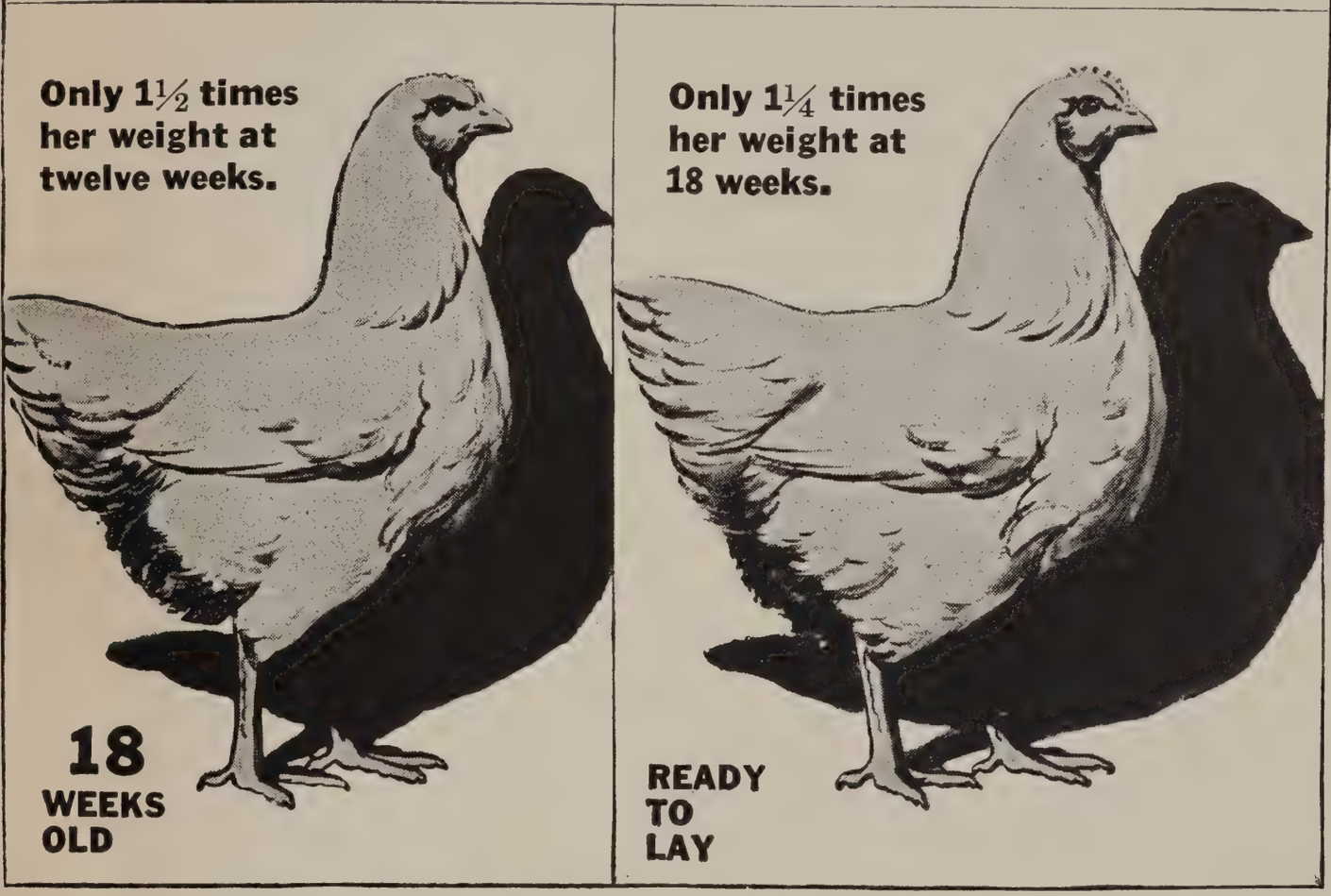
LARRO CHICK BUILDER

for the first 12 weeks—when growth rate is rapid

THIS combined starting and growing mash is specially designed for the first 12 weeks when normal chicks multiply their initial weight by as much as 30 times. It provides for this tremendously important period—helps to keep them growing steadily, without setbacks or interruptions and to take them smoothly and safely to the 12-weeks' point where they begin to look like miniature hens. No other mash is fed during this period—just Larro Chick Builder and Larro Grains. That's another advantage for you. Many years of careful feeding tests with thousands of chicks at Larro Research Farm and the results secured by thousands of poultrymen, have proved this an efficient, safe feeding method to turn baby chicks into big, husky, well-feathered pullets.

the RIGHT FEED at the RIGHT TIME

Typical Average Growth Rate for Second 12 Weeks



LARRO EGG MASH

from the 13th week onward—when growth rate is slower

AFTER about 12 weeks on Larro Chick Builder the pullets should be changed to Larro Egg Mash and kept on this ration all the rest of their lives. This completes their growth and development, brings them into laying at the right time, as far as age at maturity is influenced by the feed, and helps prepare them for the job of heavy, continuous production which is ahead. No tapering off is necessary when the change to Larro Egg Mash is made. For Larro Chick Builder and Larro Egg Mash are so closely related—so well "geared"—that there is no shock whatever to the birds and no interruption of the growth process. Larro Egg Mash and Scratch Grains, fed as directed, go a long way to make the most of the inherited capacity of every bird and to convert them into big, sturdy, profitable layers and breeders.

How Much Feed Do They Eat?

A growing pullet of one of the larger breeds will, naturally, consume more feed than will one of the smaller breeds. Likewise, a pullet of a large strain will require more feed for growth than will a pullet from a small strain of the same breed.

The following tables give the approximate feed consumption for different strains of Leghorns and Plymouth Rocks during the growing period. These figures are based upon actual feeding records from the Larro Research Farm and were obtained from a large number of experiments involving large numbers of birds. Of course, under varying conditions feed consumption will vary somewhat, but the amounts given will serve as an approximate guide. Figures for the first 12 weeks are for an average of both sexes. Those after 12 weeks are for pullets only.

Table A—Average Feed Consumption per Bird for Leghorns to 20 Weeks of Age

Period By Weeks	Average All Strains			Average Small Strains			Average Large Strains		
	Lbs. Mash	Lbs. Grain	Lbs. Total Feed	Lbs. Mash	Lbs. Grain	Lbs. Total Feed	Lbs. Mash	Lbs. Grain	Lbs. Total Feed
1st and 2nd	0.38	0.02	0.40	0.34	0.02	0.36	0.41	0.03	0.44
3rd and 4th	0.74	0.14	0.88	0.58	0.13	0.71	0.84	0.19	1.03
5th and 6th	1.09	0.24	1.33	1.04	0.20	1.24	1.14	0.27	1.41
7th and 8th	1.42	0.48	1.90	1.33	0.43	1.76	1.48	0.50	1.98
9th and 10th	1.48	0.50	1.98	1.32	0.48	1.80	1.53	0.51	2.04
11th and 12th	1.52	0.54	2.06	1.42	0.49	1.91	1.61	0.56	2.17
13th and 14th	0.73	1.12	1.85	0.61	1.03	1.64	0.75	1.23	1.98
15th and 16th	0.75	1.13	1.88	0.57	1.02	1.59	0.76	1.23	1.99
17th and 18th	0.72	1.28	2.00	0.63	1.09	1.72	0.79	1.44	2.23
19th and 20th	0.77	1.62	2.39	0.69	1.32	2.01	0.83	1.52	2.35

Table B—Average Feed Consumption per Bird for Plymouth Rocks to 24 Weeks of Age

Period By Weeks	Average All Strains			Average Small Strains			Average Large Strains		
	Lbs. Mash	Lbs. Grain	Lbs. Total Feed	Lbs. Mash	Lbs. Grain	Lbs. Total Feed	Lbs. Mash	Lbs. Grain	Lbs. Total Feed
1st and 2nd	0.40	0.03	0.43	0.37	0.03	0.40	0.42	0.03	0.45
3rd and 4th	0.76	0.16	0.92	0.71	0.15	0.86	0.82	0.17	0.99
5th and 6th	1.14	0.26	1.40	1.07	0.23	1.30	1.24	0.29	1.53
7th and 8th	1.46	0.48	1.94	1.35	0.45	1.80	1.54	0.53	2.07
9th and 10th	1.55	0.53	2.08	1.38	0.49	1.87	1.59	0.62	2.21
11th and 12th	1.69	0.55	2.24	1.54	0.61	2.15	1.76	0.65	2.41
13th and 14th	0.81	1.31	2.12	0.74	1.27	2.01	0.86	1.39	2.25
15th and 16th	0.82	1.34	2.16	0.79	1.25	2.04	0.90	1.43	2.33
17th and 18th	0.92	1.44	2.36	0.80	1.44	2.24	0.94	1.54	2.48
19th and 20th	1.04	1.51	2.55	0.96	1.52	2.48	0.99	1.60	2.59
21st and 22nd	1.12	1.48	2.60	0.98	1.46	2.44	1.02	1.64	2.66
23rd and 24th	1.08	1.46	2.54	1.05	1.41	2.46	1.14	1.44	2.58

Table C—Average Feed Required to Rear 100 Leghorn Pullets to 20 Weeks of Age

Feed Required	Average of All Strains	Average of Small Strains	Average of Large Strains
Larro Chick Builder	662 lbs.	603 lbs.	700 lbs.
Larro Chick Grains	40 lbs.	35 lbs.	49 lbs.
Larro Egg Mash	297 lbs.	250 lbs.	313 lbs.
Larro Scratch Grains	667 lbs.	586 lbs.	699 lbs.

Table D—Average Feed Required to Rear 100 Plymouth Rock Pullets to 24 Weeks of Age

Feed Required	Average of All Strains	Average of Small Strains	Average of Large Strains
Larro Chick Builder	700 lbs.	642 lbs.	737 lbs.
Larro Chick Grains	45 lbs.	41 lbs.	49 lbs.
Larro Egg Mash	579 lbs.	532 lbs.	585 lbs.
Larro Scratch Grains	1010 lbs.	990 lbs.	1084 lbs.

Table E—Average Feed Required to Rear 100 Pullets—General Purpose Breeds—to 20 Weeks of Age

Feed Required	Average of All Strains	Average of Small Strains	Average of Large Strains
Larro Chick Builder	700 lbs.	642 lbs.	737 lbs.
Larro Chick Grains	45 lbs.	41 lbs.	49 lbs.
Larro Egg Mash	359 lbs.	329 lbs.	369 lbs.
Larro Scratch Grains	716 lbs.	703 lbs.	776 lbs.

How Fast Do They Grow?

Growth rate, like feed consumption, livability and egg production, will vary with different breeds and strains and, of course, with different management and environmental conditions. This makes it impossible to give any definite figures which will be achieved on any specific flock, but Tables F and G are offered as a dependable general guide. The figures given for Plymouth Rocks will also apply to all general purpose breeds, such as Rocks, Wyandottes and Reds.

With good chicks, good environment and good management, any feeder who adopts the Larro Pullet Raising Plan should be able to equal or excel these results.

Table F—Average Weights of Leghorn Pullets Grown According to the Larro Pullet Raising Program

Average Weight of Each Leghorn Pullet	Average Weight of All Strains	Average Weight of Small Strains	Average Weight of Large Strains
At 2 weeks of age	0.23 lbs.	0.19 lbs.	0.25 lbs.
At 4 weeks of age	0.51 lbs.	0.45 lbs.	0.55 lbs.
At 6 weeks of age	0.90 lbs.	0.84 lbs.	0.95 lbs.
At 8 weeks of age	1.30 lbs.	1.16 lbs.	1.38 lbs.
At 10 weeks of age	1.72 lbs.	1.51 lbs.	1.85 lbs.
At 12 weeks of age	1.99 lbs.	1.76 lbs.	2.19 lbs.
At 14 weeks of age	2.23 lbs.	2.02 lbs.	2.41 lbs.
At 16 weeks of age	2.55 lbs.	2.27 lbs.	2.73 lbs.
At 18 weeks of age	2.78 lbs.	2.50 lbs.	2.96 lbs.
At 20 weeks of age	3.07 lbs.	2.73 lbs.	3.18 lbs.
At 22 weeks of age	3.31 lbs.	2.97 lbs.	3.43 lbs.
At 24 weeks of age	3.50 lbs.	3.18 lbs.	3.67 lbs.

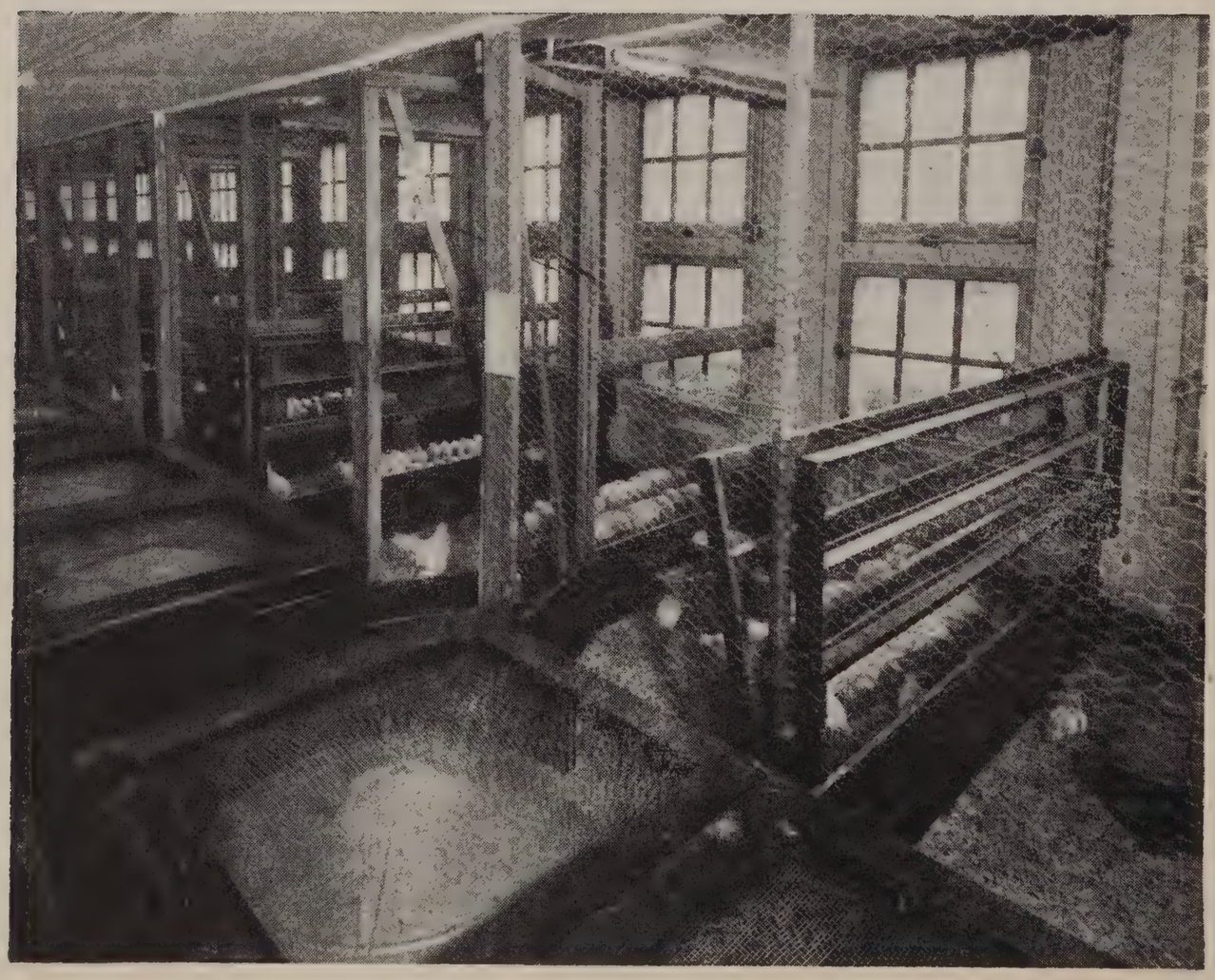
Table G—Average Weights of Plymouth Rock Pullets Grown According to the Larro Pullet Raising Program

Average Weight of Each Plymouth Rock Pullet	Average Weight of All Strains	Average Weight of Small Strains	Average Weight of Large Strains
At 2 weeks of age	0.25 lbs.	0.20 lbs.	0.27 lbs.
At 4 weeks of age	0.62 lbs.	0.55 lbs.	0.66 lbs.
At 6 weeks of age	1.00 lbs.	0.94 lbs.	1.06 lbs.
At 8 weeks of age	1.48 lbs.	1.39 lbs.	1.54 lbs.
At 10 weeks of age	1.96 lbs.	1.85 lbs.	2.09 lbs.
At 12 weeks of age	2.51 lbs.	2.33 lbs.	2.62 lbs.
At 14 weeks of age	2.93 lbs.	2.74 lbs.	3.13 lbs.
At 16 weeks of age	3.36 lbs.	3.17 lbs.	3.55 lbs.
At 18 weeks of age	3.81 lbs.	3.58 lbs.	4.06 lbs.
At 20 weeks of age	4.14 lbs.	3.82 lbs.	4.46 lbs.
At 22 weeks of age	4.77 lbs.	4.43 lbs.	5.24 lbs.
At 24 weeks of age	5.10 lbs.	4.71 lbs.	5.67 lbs.

Convenient Feeding Calendar

The Busy Chick Grower Will Find the Following Feeding Calendar Handy and Convenient.

Period	Water	Hard Grit	Mash	Grains	Supplements
1st Day	First Thing Supplied	A handful per 100 Chicks	Larro Chick Builder—Four 30-Minute Feedings	None	None
2nd Day Through 10th Day	At All Times	None	Larro Chick Builder in Hoppers	None	None
11th Day Through 6th Week	At All Times	In hoppers After 3rd Week	Larro Chick Builder in Hoppers	Larro Chick Grains, Hand-fed; 1 lb. Grain to each 5 lbs. Mash Eaten	None
7th Week Through 12th Week	At All Times	At All Times	Larro Chick Builder in Hoppers	Larro Scratch Grains, Hand-fed; 1 lb. Grain to Each 3 lbs. Mash Eaten	None
13th Week to Laying Maturity	At All Times	At All Times	Larro Egg Mash in Hoppers	Larro Scratch Grains in Hoppers	None
Laying Stock of All Ages	At All Times	At All Times, also Oyster Shell	Larro Egg Mash in Hoppers	Larro Scratch Grains	None



Interior of a brooder house at Larro Research Farm showing chicks on vitamin tests.

Pullets on range at Larro Research Farm.

Facts About Feed and Maturity

For many years poultry raisers customarily fed Growing Mashes (which were usually three to four per cent lower in protein than Egg Mashes), and continued the use of such Growing Mashes until their pullets had reached about ten to twenty per cent production before changing them to Egg Mashes. This was based upon the belief that the lower protein mash would both prevent too early egg production and assure the production of larger eggs.

There was a more or less sound basis for this belief so long as both Growing Mashes and Egg Mashes were nutritionally incomplete in several factors other than protein. It was, necessarily, customary to make the mash constitute from thirty-five to fifty per cent, or more, of the total ration during the growing period. With this relatively high consumption of mash necessary to supply these other nutrient factors, it becomes readily evident that the higher the percentage of protein in such mash the higher would be the percentage of protein in their total food intake.

With the advance in the science of nutrition, Larro Egg Mash has been so improved that it has been found practical to feed a **much smaller percentage** of mash during the growing period (from the twelfth week on), and consequently more of the less expensive grains.

The test reported below (known as Project N-31) was conducted at Larro Research Farm to get an actual comparison of the results produced by Larro Egg Mash, versus two lower protein mashes, fed to growing pullets and especially as it affected egg production and egg size.

The birds used were 12-weeks-old Leghorn pullets—carefully divided into three separate groups on the basis of comparable size, inherited capacity and general condition. They were placed in colony houses with range yards, and fed as follows:

Group I: Larro Egg Mash.

Group II: A "Growing Mash" containing **3.33% less protein** than Larro Egg Mash

Group III: A "Low Protein Mash" containing **7.6% less protein** than Larro Egg Mash.

Each group was given free access to their respective mashes and to Larro Scratch Grains in separate hoppers.

In both the "Growing Mash" and the "Low Protein Mash" consideration was given to providing a proper supply of factors other than proteins (such as flavin, vitamin G, etc.) so they would be typical of really good mashes of their protein ranges.

What the Test Revealed

The results of this interesting test are best presented, we believe, in question and answer form. Here are some of the more important questions and the answers the pullets themselves gave us.

1. What happened to the mash consumption when you fed a lower-protein ration?

The lower the percentage of protein in the mash, the greater was the consumption of mash both in pounds consumed and in percentage of total feed eaten.

Average mash consumption per bird, and per cent mash of total feed consumed, to 22 weeks of age, were:

Group I: 2.83 lbs. Larro Egg Mash; which was 26.4% of total feed.

Group II: 3.28 lbs. "Growing Mash"; which was 32.1% of total feed.

Group III: 3.79 lbs. "Low Protein Mash"; which was 34.5% of total feed.

2. How did the feed cost of the Larro Egg Mash birds (Group I) compare with that of the birds in the other two groups?

The relative retail values of the various rations in this test were:

Larro Egg Mash	**at $2.48 per cwt.**
"Growing Mash"	**at 2.38 per cwt.**
"Low Protein Mash"	**at 2.23 per cwt.**
Scratch Grains	**at 1.70 per cwt.**

Due to the fact that the mash consumption was so much higher in Group II and Group III, the birds balanced out the lower price so that the cost per pullet was about equal in all groups. Here are the figures:

Group I: On Larro Egg Mash.....20.3c per bird

Group II: On "Growing Mash".....20.3c per bird

Group III: On "Low Protein Mash".....20.1c per bird

Exactly the same feed cost per pullet would have been found in each group had the "Low Protein Mash" been figured at $2.28 per cwt. ($4.00 less per ton than Larro Egg Mash).

3. How did the body weights of the Larro Egg Mash birds compare with those of Group II and Group III?

The Larro Egg Mash pullets (Group I) were heavier at 22 weeks than the others—averaging from 2½ to 3¾ ounces more per bird.

4. How about maturity? Did the difference in protein content of the mashes have any effect on the "age at first egg?"

There was no significant difference in the age at which the first pullets started to lay in each group. At 160 days of age, 25 to 30% had started production in all 3 groups.

There was a considerable difference, however, between the groups in the time required for **all** pullets to start production. After the last pullet in the Larro Egg Mash Group I had laid her first egg, it was still 23 days before the last pullet in the "Growing Mash" Group II laid her first egg; and 28 days before the last pullet in the "Low Protein Mash" Group III laid her first egg.

The following table shows the percentage of pullets starting to lay at various ages in each group.

First Egg Laid At:	Per Cent of Pullets In		
	Group I	Group II	Group III
Age of 160 Days	30	25	25
Age of 175 Days	55	37	50
Age of 190 Days	90	56	50
Age of 205 Days	95	88	82
Age of 220 Days	100	88	82
Age of 224 to 248 Days	—	100	100

The age at which egg production started, in each group, may also be expressed in another way, as follows:

First Egg Laid By:	Average Age (Days)		
	Group I	Group II	Group III
First 20% of Pullets	149	155	156
First 40% of Pullets	155	160	160
First 60% of Pullets	161	170	170
First 80% of Pullets	165	177	175
Entire 100% of Pullets	171	186	187

The age, in days, at which each pullet laid its first egg, ranged from:

Group I: 145 to 210 days old (elapsed period of 65 days);

Group II: 154 to 242 days old (elapsed period of 88 days);

Group III: 155 to 248 days old (elapsed period of 93 days).

5. How about Egg Size? Did the protein level have any effect on this characteristic?

The difference in protein levels of mashes consumed made no significant difference in the average size of the first ten eggs produced by pullets which started to lay within any given age range.

The age at which the pullets started to lay (regardless of the protein level of their mashes) did significantly influence the size of their first eggs. This is in direct accord with the statement so generally accepted by scientists that: "Sexual maturity is influenced more by breeding than by feeding."

The following table shows the average size (in ounces per dozen) of the first 10 eggs laid by the pullets in each group, classified according to the age at which the pullets started to lay:

Average Weight of first 10 eggs laid by pullets starting production at age of:	Wt.—Ounces Per Dozen		
	Group I	Group II	Group III
145 to 160 Days Old	17.1	17.3	17.6
161 to 190 Days Old	19.4	19.6	20.1
191 to 220 Days Old	21.0	21.0	20.5
Over 220 Days Old	*	22.1	22.4

*All pullets in Group I had started production before they were 220 days old.

6. What did the results show regarding the relationship of egg production to egg size?

By the time the pullets in Group I had produced 25 eggs per bird:

(a) Those in Group II, raised on "Growing Mash" had produced 14½ eggs per bird;

(b) Those in Group III, raised on "Low Protein Mash" had produced only 8 eggs per bird.

And, at that time there was no significant difference in egg size (actually a maximum variation of only 2/10ths of an ounce per dozen in the average weights of the eggs being laid by the three groups).

If we consider these "Pullet Eggs" as being worth only 18c per dozen, we find that:

(a) The 10½ more eggs per bird from the Larro Egg Mash Group I meant an added income of 15¾ cents more per bird, **up to that time alone,** than from the "Growing Mash" Group II. Even had the Larro Egg Mash cost $10.00 more per ton, the extra egg production would have repaid this extra cost of feeding the pullets to 22 weeks and in addition would have yielded 9¼ cents more profit per bird over feed cost.

(b) The 17 more eggs per bird from the Larro Egg Mash Group I meant an added income of 25½ cents more per bird, **up to that time alone,** than from the "Low Protein Mash" Group III. In this case, had the Larro Egg Mash cost $15.00 more per ton than the "Low Protein Mash", the extra egg production would have repaid this extra cost of feeding the pullets to 22 weeks and in addition would have yielded 18½ cents more profit per bird over feed cost.

Do not overlook the fact that the above added profits were realized by the time the Larro Egg Mash Group I had laid an average of 25 eggs per bird. Any continued better results through the balance of the production year would have meant still further financial benefits to the feeder.

7. Suppose the grains had been hand-fed to the birds in Group II and Group III. What difference would this have made?

Had the "Growing Mash" and "Low Protein Mash" Groups been hand-fed grains in limited quantities—as was so long the custom with nutritionally less complete mashes—it becomes evident that:

(a) Feeding cost per bird would have been substantially increased by the higher proportion of mash and smaller proportion of less expensive grains required; and,

(b) The feeder would have had a greater labor expenditure as compared to that required by the hopper feeding of both mash and grain.

The results of this test further confirm the excellent results produced by the Larro Pullet Growing Program—Larro Chick Builder, **with controlled grains feeding,** for the first 12 weeks; then Larro Egg Mash and Scratch Grains, **both hopper fed to maturity.** This use of Larro Egg Mash gave us better results than did either "Growing Mash" or "Low Protein Mash."

Managing Chicks and Pullets

Each year at Larro Research Farm, thousands of baby chicks are hatched and grown. Many different feeds and feeding methods are tried. New management ideas are explored. Suggestions of all sorts that give promise of increased profit for the flock owner are given an opportunity to prove their worth under conditions like those which prevail with any well-managed poultry flock.

Here is the 10-part program which we have found most successful at Larro Research Farm:

Good Chicks, Well Hatched, from Healthy Parent Stock

Since no chick is better than its parents, it is important that it have good ancestors. A good chick must also be well-hatched and healthy. Chicks resulting from a poor hatch seldom do well. Cull the chicks that go into the brooder most rigidly. Take no chances with puny, low-vitality chicks. Weak chicks have little resistance to disease and, consequently, are a menace to the health of the rest of the flock.

A Good Brooder

Only a good, dependable brooder, well attended, will provide a reliable source of adequate, even heat. Investing in a good brooder is good chick insurance.

A Good Brooder House, Properly Prepared

Of course, even the best brooder requires a well-constructed brooder house to function properly. Attempting to raise good chicks in a drafty, poorly built brooder house is like pouring milk into cracked bottles or shipping a valuable cargo in a leaking vessel.

The floor and the walls of the brooder house, up to a height of at least 3 or 4 feet, should be tight, without any cracks or knot-holes in order to prevent drafts from striking the chicks. Drafts of this kind are responsible for many cases of chilling, "pasting-up behind" and common diarrhea.

It is not an uncommon experience to meet a chick raiser who expects the arrival of chicks within a few days and whose brooder house has not even been cleaned following last year's brood; the stovepipe may be completely corroded, the thermostat wafer lost, several window lights broken, not to mention other details. Anyone starting his chicks under such conditions is inviting trouble.

Information regarding the construction of a good, practical brooder house will be sent free upon request to Dept. M., Larrowe Milling Company, Detroit, Mich. Ask for Larro Service Bulletin No. 4, entitled "Colony Brooder House."

Proper, Uniform Temperature

Good, continuous growth requires proper, uniform temperature. Overheating, chilling or sharp changes in temperature are harmful, especially during the first few weeks of the chick's life. They are likely to affect the lungs, causing congestion leading to pneumonia, both of which are generally fatal. In less severe cases bowel trouble develops, growth is checked and resistance to disease is lowered. Let us remember that a chick once stunted may always remain stunted. The chick is such a delicate and high-geared mechanism, grows so rapidly and reaches maturity within so short a period of time, that often the results of mistakes can not be corrected.

The brooder should be run according to the manufacturer's directions. He is just as much interested in your success as you are and he knows best how to operate his brooder. Be sure that the chicks are not chilled when transferring them to the brooder. Operate the brooder a few days before putting the chicks under it to be sure everything is right. Unless the manufacturer instructs you otherwise, when you get your chicks, maintain a temperature of 95 to 98 degrees F. on the edge of hover, about three inches above the floor, lowering this temperature about five degrees each week until, beginning with the fifth week, 75 degrees is generally correct for the balance of the brooding period.

It will take several days before the chicks realize the functions of their "artificial mother," but they quickly learn to return to the stove for warmth. It is good practice to place a piece of one-inch wire netting, one foot high and covered with burlap or cotton sacks, around the brooder stove, about 1½ feet from the hover. The distance should be increased during the daytime as the chicks grow. After 6 or 7 days the circular fence enclosure should cover the whole floor, cutting off the corners to prevent the chicks piling up. The bad habit of crowding and piling up can be reduced and controlled by the use of a dim light, all night. A 5 or 10-watt bulb or one of the well-known kerosene storm lanterns provide sufficient light for this purpose in the ordinary brooder pen.

Moving a range shelter to a new location at Larro Research Farm. Where ranges are used, clean ground is one of the essentials of a successful program of disease prevention.

It is important to have the chicks form a circle around the hover at night. The experienced poultryman can tell at a glance by the position of the chicks around the hover whether the temperature is right. When there is too much heat the chicks settle farther away from the hover, while with decreasing temperature they come nearer to the source of heat.

Watch the chicks as they settle down for the night. When they bunch up in one or two struggling masses, distribute them evenly around the stove. There is a certain short time at dusk when this can best be done. Some lots of chicks will gather in ring shape unaided, others need and should be given help, since their habits are formed during the first few days. There is much truth in the statement that the secret of raising chicks successfully is to get them through the night properly. The best flocks are usually raised by those who look after the brood late at night and very early in the morning.

Good Ventilation without Drafts

Since brooder houses are artificially heated, the matter of furnishing ventilation is comparatively simple. The temperature of the brooder house is usually much higher than the outside temperature and, therefore, it is not difficult to secure an effective movement of air by swinging the top of the windows in or by providing hinged ventilator boards over the plates, between the rafters, in the front and rear of the house. During hot weather, when ventilation is particularly essential, all windows should be removed, and in warm climates special openings in the rear should be provided.

Provide Sufficient Brooding Space

Trying to raise two or three chicks on a space in which only one chick should be raised is frequently responsible for high mortality and stunted growth, not to mention such accompanying social vices as toe picking, feather pulling and cannibalism. When reared in confinement allow ½ square foot per bird for first 6 weeks; allow increased space as birds develop until at least 3 square feet per bird are available from 16 weeks to maturity.

These figures show that the number of chicks that can safely and efficiently be raised under one stove is determined not only by the heating capacity of the stove, but also the floor space of the brooder room. It should also be remembered that with increases in body size the chicks need proportionately more space. This is a point that is too frequently overlooked.

It is a good plan to teach the chicks to roost early. When they are five weeks old, small roosts, not over 10 or 12 inches from the floor, should be installed to induce roosting.

The double compartment brooder house—one compartment with heater, the other compartment as a scratching place—has given good results. In the scratching shed the chicks may exercise at a lower tem-

perature. If there is an abundance of fresh air and sunlight, this will help to harden the chicks and stimulate their appetites and healthy development.

Good Sanitary Conditions, Including Dry, Clean Litter

Cleanliness is essential to the chicks' health. It calls for a program that starts well before the house is occupied by the chicks. The use of reliable disinfectants is helpful but they are only of value if preceded by thorough mechanical scrubbing. As one poultryman expressed it: "Elbow grease is as important as the disinfectant itself."

It is surprising how many people attempt to raise chicks on bare floors or on floors but scantily sprinkled with litter. A generous layer of litter is important for several reasons, but chiefly because a liberal supply of it "dilutes," as it were, disease organisms that may be present, and because it affords a chance to remove these organisms frequently, together with the litter. For instance, coccidiosis is literally picked up by the chick from the litter, from the ground and from contaminated feed or water. The severity of coccidial infection depends upon the resistance of the birds and the number of coccidia they pick up. With scanty litter the chicks may pick up massive doses of coccidia, while with a liberal supply of litter frequently changed, the doses which they may pick up are more or less "diluted." A few coccidia are not likely to be harmful. In fact, in the light of our present knowledge, they may be of some protective value.

The litter should be kept dry, and when it becomes damp it should be immediately removed and replaced. Damp litter creates conditions favorable to the development of some organisms which cause disease, notably coccidiosis and the so-called fungus diseases. Furthermore, the anatomy of the chick is not adapted to damp conditions.

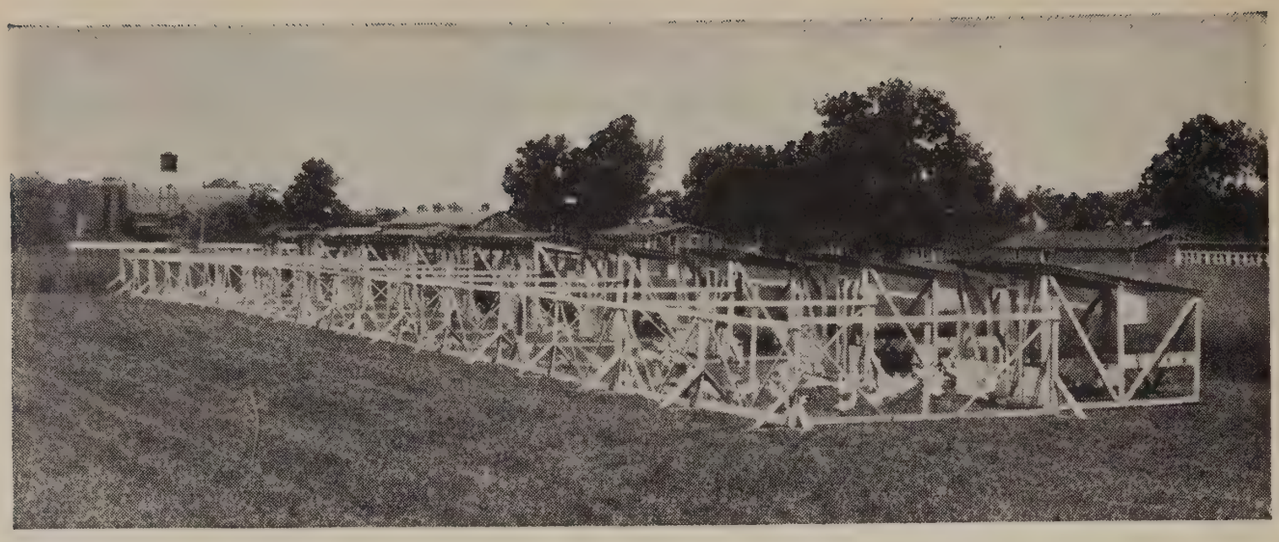
Plenty of Direct Sunlight

The absence of sunlight does not interfere with the normal growth of chicks when they are raised on Larro Chick Builder, for it provides the full protection against rickets afforded by direct sunlight. But the ultra-violet rays of sunlight are a most potent destroyer of disease germs. It should be remembered, however, that sunlight filtered through ordinary glass is void of the beneficial ultra-violet rays and in this respect is valueless for chicks. Wherever possible, chicks should have access to direct sunlight.

Raising Chicks on Range

The advantages of good, clean range and general sanitary conditions do not require special explanation, yet they are often neglected. Many poultrymen raise chicks on the same ground year after year, even after serious outbreaks of such epidemics as Pullorum Disease, Coccidiosis, Fowl Paralysis and Leucosis.

The rapidly increasing practice of providing for a 2-, 3- or 4-year rotation of the growing range indicates that practical poultrymen realize the dangers of contaminated soil. In addition to a rotation of the



Range rotation is practiced at Larro Research Farm. Here is a view of one of the ranges. Plans for the convenient portable poultry fences shown will be sent upon request.

range, some careful chick growers move the brooder or growing house from time to time. Some sort of shade during the hot summer months is appreciated by the flock. During hot weather the growth of young stock occasionally comes almost to a standstill. Everything else being equal, flocks in well-shaded surroundings do not usually manifest such a slowing down.

Unlike most farm stock, fowl cannot adjust themselves to extremely hot weather. Success in growing them is to some extent influenced by their opportunity to find shade. When the construction of the building permits it, the youngsters seek the comfort of shade by crawling under the building. For obvious reasons, this should be prevented by suitable adjustments.

In the absence of trees, shade can be provided by planting corn, sunflowers, Jerusalem artichokes, sweet clover or other rapidly growing crops. Convenient management and ease of operation require that such plantings do not come too close to the building occupied by the chicks. Then, too, chicks have the habit of staying near the buildings; shade at a little distance entices them away and correspondingly reduces the degree of contamination near the house. Where suitable, clean range cannot be provided, chicks may be grown without range, by the so-called confinement method. As a rule, chicks can be grown more economically on range.

Raising Chicks in Confinement

Sometimes conditions prevail where clean range can not be provided. Since there are no practical means of completely overcoming or correcting soil contamination, there remains under such conditions but one alternative: to raise the chicks "off" the soil.

There are several modifications and variations in the methods of raising chicks "off ground". Often the method to be followed will depend upon the type of housing equipment already on hand.

The customary brooder house lends itself well to this method. All openings should be covered with fly screens if protection against tapeworms is desired. The screening should be of fine mesh to prevent passage of small beetles. Windows and openings should be so located

as to admit as much direct sunshine as possible, because sunlight is a very effective germ destroyer. Although the beneficial ultra-violet rays of the sunshine are important for proper health, growth and bone development of the chicks, the poultry raiser using Larro is not concerned on this score because Larro Poultry Mashes contain a very potent Vitamin Extract which adequately meets the vitamin D requirement of the bird and obviates the need of providing sunlight as far as the feed is concerned.

With this method the chicks are confined to the house at all times. So-called sun porches may or may not be used. It should be noted, though, that sun porches do not increase the capacity of the house.

When chicks are raised in confinement, the following points are of special importance: sanitation, which calls for frequent removal of the litter and cleanliness of feeding and watering utensils; abundance of floor space, of feeding space and of watering space.

This spectrograph is used in the study of some of the mineral constituents of feeds and of animal tissues and bones. A number of rare elements and trace minerals can be detected more readily by the use of this apparatus than by test-tube chemistry.

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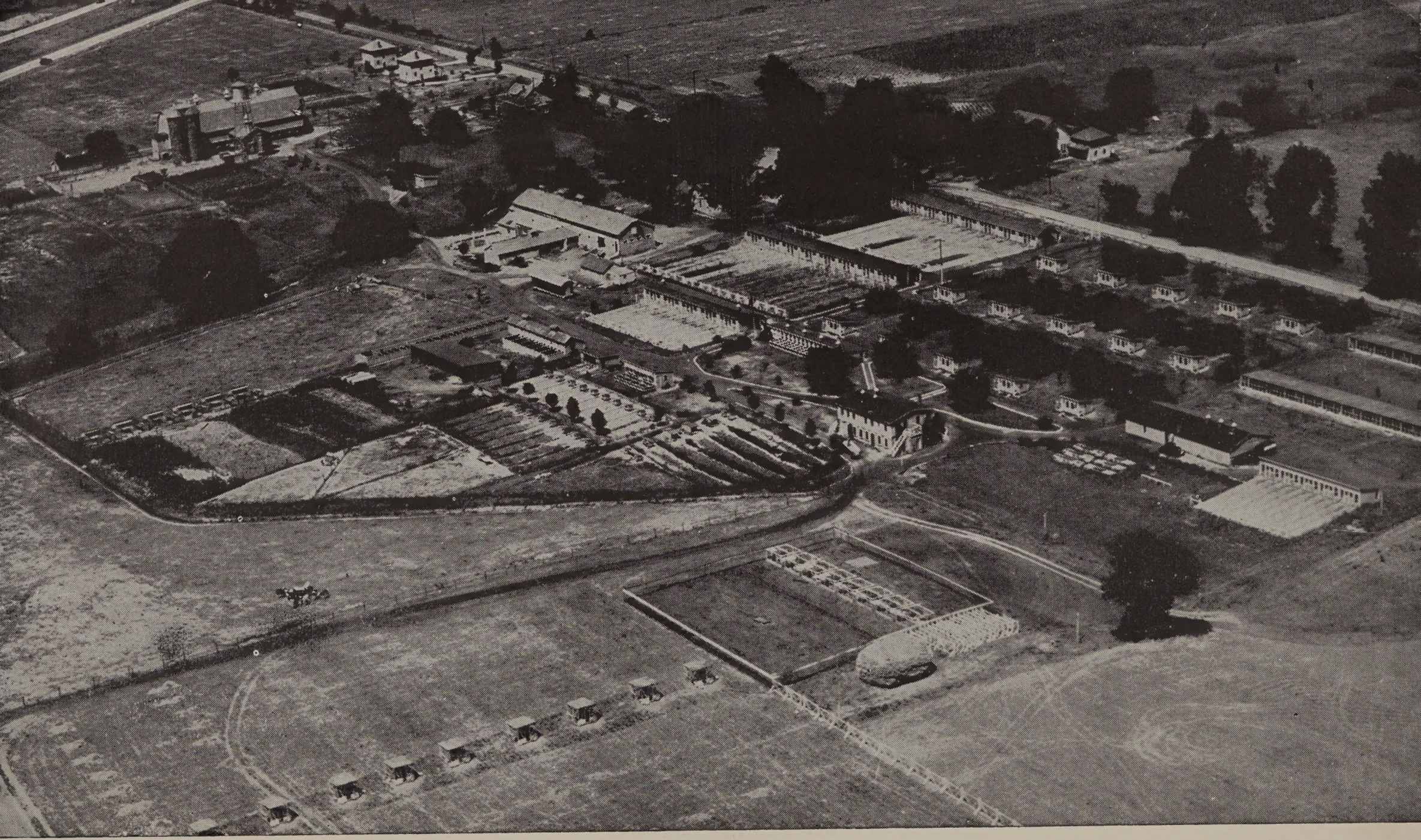

Larro Research Farm, where Larro Feeds are developed and kept on test. The buildings of the dairy division are at the upper left and center. Below the barn near the center of the photograph are the hog pens and farrowing house where Larro Hog Feeds are tested. The buildings at the right center are used by the Poultry Division. The two-story building seen directly above the hay stack houses the incubators, laboratory and X-ray room.

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